



PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: David KROPACZEK et al. Conf.: 2333
Appl. No.: 10/678,183 Group: 2128
Filed: October 6, 2003 Examiner: Thai Phan
For: METHOD AND APPARATUS FOR CREATING AND EDITING A
NUCLEAR REACTOR CORE LOADING TEMPLATE
Docket No.: 24GA5999 (8564-000041/US)

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APPELLANT'S BRIEF ON APPEAL UNDER 37 C.F.R. §41.37

Sir:

In accordance with the provisions of 37 C.F.R. §41.37, Appellants submit the following:

I. REAL PARTY IN INTEREST:

The real party in interest in this appeal is Global Nuclear Fuel-Americas, LLC.
Assignment of the application was submitted to the U.S. Patent and Trademark Office on
February 6, 2004, and recorded on the same date at Reel 014958, Frame 0402.

II. RELATED APPEALS AND INTERFERENCES

No related appeals or interferences are known.

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III. EVIDENCE SUBMITTED UNDER 37 C.F.R. 1.130, 1.131 OR 1.132:

None.

**IV. DECISIONS RENDERED BY A COURT OR THE BOARD IN RELATED
APPEALS AND INTERFERENCES SECTION:**

None.

V. STATUS OF CLAIMS:

Claims 1-8, 10, 11, and 13-16 are pending. Claims 1 and 16 are independent. The pending claims stand rejected as follows:

1. Claims 1-8, 10, 11, and 13-16 under 35 U.S.C. §103(a) as being unpatentable over 2004/0196946 to Chao et al. ("Chao") in view of US Patent 6,404,437 to Russell et al. ("Russell").

Claims 1-8, 10, 11, and 13-16 are being appealed.

VI. STATUS OF AMENDMENTS:

No amendments were filed after the Final Office action dated April 3, 2007.

VII. SUMMARY OF CLAIMED SUBJECT MATTER:

The following explains the subject matter set forth in each independent claim by way of example embodiments in the specification by page and line number, and in the drawings, if any,

by reference characters only to satisfy 37 C.F.R. § 41.37(c)(1)(v). This concise explanation relies on example embodiments from the specification to describe the claims; however, the claims recite subject matter not limited to these example embodiments. Independent claims 1 and 16 and dependent claims 2 and 3 are argued on appeal and discussed below.

Claim 1

Claim 1 is directed to a method for creating a nuclear core template. A nuclear core template is a template formatted to represent the geometry of a nuclear core of a nuclear reactor¹ and may be used to generate loading maps, which indicate where fuel bundles are placed in the core, from the nuclear core template.²

The method of claim 1 includes “selectively assigning, using a graphical user interface providing a graphical representation of a nuclear reactor core, fuel bundle categories to fuel bundle positions in the graphical representation to create a template.” That is, each position within the finished template will have an associated fuel bundle category as a result of the assignment.³ For example, in Figure 2, the several bundle positions 38 in the field 36 may be assigned a fuel bundle category. The categories in example embodiments include fresh, reinsert, and locked.⁴ The fresh category requires that only a new bundle may be placed in a position assigned this category in the template.⁵ The locked category requires a specific bundle to be placed in a loading map created from the template based on the actual bundle currently occupying that position in the actual core.⁶ The reinsert category requires that only bundles that

¹ See Specification as filed (“Spec”), ¶ [0013], ll. 4-6; *See, e.g.*, FIG. 2, element 36.

² See Spec ¶ [0022], ll. 1-4.

³ See Spec ¶ [0015], ll. 1-12.

⁴ See Spec ¶ [0016], ll. 1-8.

⁵ See Spec ¶ [0016], ll. 8-9.

⁶ See Spec ¶ [0017], ll. 1-4.

have previously been in an operational core may be placed in a reinsert-assigned template position.⁷

The nuclear core template may then be used to generate a loading map, having, as recited in claim 1, constraints that “only a fuel bundle matching the assigned fuel bundle categories to the fuel bundle positions be allowed to be loaded in the fuel bundle position.”⁸ That is, a loading map generated from the created template must conform to the assigned category-position requirements of the nuclear core template. Through this method, core designers no longer have to create loading maps from scratch, and may limit the universe of potential loading map configurations based on engineering determinations made in generating the template.⁹

Claim 2

Claim 2 is dependent upon claim 1, and, in addition to the elements of claim 1, recites:

“fuel bundle categories include fresh and locked, the fresh category indicating to insert an unexposed fuel bundle, the locked category indicating that a fuel bundle currently occupying an associated fuel bundle position in an actual nuclear reactor core remains in that position in creating a new nuclear reactor core loading map.”

Thus, a template may have the fresh category assigned to individual positions, in which only a new bundle may be placed in a loading map created from the template.¹⁰ The template may also have the locked category assigned to individual positions, which requires a specific bundle to be placed in a loading map created from the template based on the actual bundle currently occupying that position in the actual core.¹¹ Through this example embodiment, users may place age and location restrictions on a loading map created from the example templates.

⁷ See Spec ¶ [0018], ll. 1-2.

⁸ See Spec ¶ [0022], ll. 1-4.

⁹ See Spec ¶ [0045], ll. 1-5.

¹⁰ See Spec ¶ [0016], ll. 8-9.

¹¹ See Spec ¶ [0017], ll. 1-4.

Claim 3

Claim 3 is dependent upon claim 2, and in addition to the elements of claims 1 and 2, recites a reinsert category that “indicates to insert a fuel bundle that has been exposed.” That is, only bundles that have previously been in an operational core may be placed in a reinsert-assigned template position.¹² The reinsert category otherwise functions as a template constraint in the same manner as the fresh and locked categories of claim 2.

Claim 16

Claim 16 is directed toward an apparatus configured to facilitate the method of claim 1. Claim 16 recites “a graphical user interface” and “a processor controlling the graphical user interface.” The processor is configured to display and allow user editing of a nuclear core template through the graphical user interface.¹³ Through this interface the user may assign categories to and create a nuclear core template.

VIII. GROUND OF REJECTION TO BE REVIEWED ON APPEAL:

Appellant seeks the Board's review of the following rejections:

1. Claims 1-8, 10, 11, and 13-16 under 35 U.S.C. §103(a) as being unpatentable over 2004/0196946 to Chao et al. (“Chao”) in view of US Patent 6,404,437 to Russell et al. (“Russell”).

¹² See Spec ¶ [0018], ll. 1-2.

¹³ See Spec ¶ [0012], ll. 1-7.

IX. ARGUMENTS:

Claims 1, 4, 5, 10, and 13- 16 rise and fall together, claims 2 and 6 rise and fall together, and claims 3, 7, 8 and 11 rise and fall together.

Claims 1-8, 10, 11, and 13-16 stand rejected under 35 U.S.C. §103(a) as being unpatentable over 2004/0196946 to Chao et al. ("Chao") in view of US Patent 6,404,437 to Russell et al. ("Russell").

A. CLAIMS 1, 4, 5, 10, AND 13-16 ARE NOT OBVIOUS OVER CHAO IN VIEW OF RUSSELL

The Examiner rejects claims 1, 4, 5 10, and 13-16 under 35 U.S.C. § 103(a) as obvious over Chao in view of Russell.¹⁴ The Examiner states that Chao discloses a method similar to that of claim 1, with the exception of the "template," which the Examiner alleges is taught by Russell.¹⁵ Specifically, the Examiner alleges that Chao and Russell together teach both: 1) a method for producing a template with constraining fuel categories assigned to each position and 2) a method of doing so by assignment.¹⁶ Applicants respectfully submit that the applied references teach neither.

With respect to creating a template with fuel categories assigned to each position in the template, Chao teaches the creation only of a final loading map from scratch, the final loading map indicating specific fuel bundles, not fuel bundle categories, assigned to each position.¹⁷ A

¹⁴ See Final Office Action Dated January 3, 2007 ("Final OA"), pp. 2-4.

¹⁵ Final OA, p. 2.

¹⁶ *Id.* at 2-3.

¹⁷ See Chao ¶¶ [0011], [0015], [0035] (indicating selection of a final loading pattern of "individual fuel assemblies").

final loading map is not a template with fuel bundle categories as recited in claim 1. A loading map is the final piece of information in the loading process and must indicate the position of specific, individual fuel bundles for loading; the template is an initial step in the loading process and does not include specific, individual bundle positions. Thus Chao does not teach or fairly suggest a template of fuel bundle categories matched with each position in the template as recited in claim 1; rather, Chao teaches a loading map with specific, individual fuel bundles.

Regarding the assignment, Chao teaches a Branching and Bounding Batch Pattern Enumerated under Constraint program that refines large groups of assemblies into individually placed assemblies in the final loading map.¹⁸ That is, there is no assignment of fuel bundles, let alone fuel categories as recited in claim 1, to individual positions in the template.¹⁹ Thus Chao does not teach or fairly suggest the user assignment to create a template as recited in claim 1 but instead insists on a program for doing so.

The Examiner relies on Russell to supply the missing features of claim 1. Russell, however, does not teach or suggest either the nuclear core template of fuel bundle categories or a method of assigning categories therein. Rather, Russell teaches a method of visually presenting core performance data in a loaded core map, not a template.²⁰ Further, the data associated with individual fuel bundles in Russell is not assignable and is not useable as a constraint template but is, instead, merely displayed and derived from raw performance data.²¹ The engineer plays no role and exercises no expertise in Russell's displaying, thus defeating the constraint assigning element of claim 1. Because Russell does not cure the disclosure and suggestion deficiencies of

¹⁸ See Chao ¶¶ [0025], [0026].

¹⁹ See *id.*

²⁰ See Russell Col. 5, ll. 34-55.

²¹ See Russell Col. 2, ll. 27-31.

Chao, Russell and Chao, alone or in combination, cannot support a prima facie case of obviousness.

Because Chao lacks each and every element of claim 1 and deals with methods distinct from those in claim 1, and because Russell does not cure these disclosure and suggestion deficiencies of Chao, Chao and Russell do not render claim 1 obvious. The Examiner does not separately address claim 16, and Applicants submit that claim 16 is allowable at least for being configured for the allowable method of claim 1. Dependent claims 2-7, 10, 11, and 13-15 are allowable at least for depending from an allowable base claim 1. Applicants respectfully request the Board overturn the Examiner's rejection under 35 U.S.C. § 103(a).

B. CLAIMS 2 AND 6 ARE NOT OBVIOUS OVER CHAO IN VIEW OF RUSSELL

The Examiner rejects claim 2 under 35 U.S.C. § 103(a) as obvious over Chao in view of Russell.²² The Examiner states very briefly that Chao discloses the fuel categories recited in claim 2, including fresh and locked categories.²³ Applicants respectfully submit that the applied references, in addition to not disclosing or teaching the elements of claim 1 incorporated into claim 2, do not further teach or suggest locked or fresh fuel categories.

Chao discloses initial bundle grouping only by reactivity.²⁴ Reactivity is, very generally, the ability of a fuel bundle to sustain the nuclear chain reaction and may, but does not necessarily, correspond to bundle "freshness" as required by the fresh category. For example, the fresh category may include bundles that have different fuel enrichments, which would result

²² See Final OA, p. 3.

²³ Final OA, p. 2.

²⁴ See Chao, Abstract; ¶ [0015]; claim 1.

in unused bundles having different reactivities while still meeting the fresh criteria for purposes of the template constraints recited in the claims. Thus grouping bundles by freshness and reactivity are not the same grouping criteria.

Reactivity is even further unrelated to the locked category. A bundle's current position and a decision to maintain that position within the reactor core does not determine that bundle's reactivity, such that a group of bundles sorted by reactivity and by a locked assignment would not have similar members. Thus Chao does not disclose differentiation of fuel bundles into locked or fresh categories as recited in claim 2.

The Examiner does not rely on Russell to disclose the locked and fresh categories of fuel bundles, and Russell does not so disclose these claim features. As stated above, Russell teaches a method of displaying fuel operations data. None of the data in Russell relates to determining fresh or locked bundles for loading in a future fuel cycle; indeed, Russell teaches operational data, which is inherently dissimilar from reloading data because the plant is non-operation during reloading.

Because Chao and Russell, alone or in combination, do not teach or suggest each and every element of claim 2, they cannot anticipate or render obvious claim 2. Claim 6, which recites the same categories as claim 2, is allowable at least for the same reasons as claim 2. Claim 3, dependent upon claim 2, is allowable at least for depending from allowable base claims 1 and 2. Reversal of the Examiner's rejection is respectfully requested.

C. CLAIMS 3, 7, 8 AND 11 ARE NOT OBVIOUS OVER CHAO IN VIEW OF RUSSELL

The Examiner rejects claim 3 under 35 U.S.C. § 103(a) as obvious over Chao in view of Russell.²⁵ The Examiner states, with no exact identification or explanation, that Chao discloses the reinsert fuel category recited in claim 3.²⁶ Applicants respectfully submit that the applied references, in addition to not disclosing or teaching the elements of claims 1 and 2 incorporated into claim 3, do not further teach or suggest reinsert fuel categories.

As discussed above, Chao discloses initial bundle grouping only by reactivity.²⁷ Reactivity does not further meet the definition of a reinsert bundle, because reinsert bundles may have a wide range of reactivities. For example, a reinsert bundle may be a bundle that has been in operation for several cycles and has virtually no reactivity remaining, or it may be a bundle that has been in operation for a single cycle and still retains much reactivity. Thus constraining bundle placement by reinsert category as in claim 3 will not result in the initial bundle groupings in Chao.

The Examiner does not rely on Russell to disclose reinsert category of fuel bundles, and Russell does not so disclose these claim features. As discussed above Russell teaches a method of displaying fuel operations data. None of the data in Russell relates to determining fresh or locked bundles for loading in a future fuel cycle; indeed, Russell teaches operational data, which is inherently dissimilar from reloading data because the plant is non-operation during reloading.

²⁵ See Final OA, p. 3.

²⁶ *Id.*

²⁷ See Chao, Abstract; ¶ [0015]; claim 1.

Because Chao and Russell, alone or in combination, do not teach or suggest each and every element of claim 3, they cannot anticipate or render obvious claim 3. Claims 7, 8 and 11, which recite the same reinsert category as claim 3, are allowable at least for the same reasons as claim 3. Reversal of the Examiner's rejection is respectfully requested.

X. CONCLUSION:

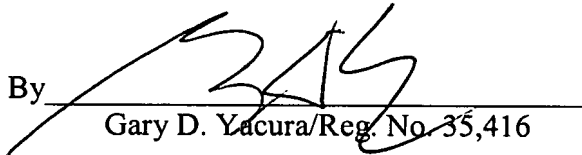
Appellants respectfully request the Board to reverse the Examiner's rejection of the pending claims.

The Commissioner is authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 08-0750 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully submitted,

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APPENDIX A

Listing of claims 1-8, 10, 11, and 13-16 on appeal:

1. A method for creating a nuclear reactor core template, comprising:
selectively assigning, using a graphical user interface providing a graphical representation of a nuclear reactor core, fuel bundle categories to fuel bundle positions in the graphical representation to create a template having as constraints that only a fuel bundle matching the assigned fuel bundle categories to the fuel bundle positions be allowed to be loaded in the fuel bundle position.
2. The method of claim 1, wherein the fuel bundle categories include fresh and locked, the fresh category indicating to insert an unexposed fuel bundle, the locked category indicating that a fuel bundle currently occupying an associated fuel bundle position in an actual nuclear reactor core remains in that position in creating a new nuclear reactor core loading map.
3. The method of claim 2, wherein the fuel bundle categories further include reinserted, the reinserted category indicates to insert a fuel bundle that has been exposed.
4. The method of claim 1, wherein the selectively assigning step includes setting a bundle group amount for a selected one of the fuel bundle categories, and selectively assigning the set bundle group amount of the selected fuel bundle category.
5. The method of claim 1, wherein the selectively assigning step includes selectively setting a symmetry associated with the set bundle group amount, the symmetry indicating whether to

repeat the selected fuel bundle category symmetrically in one or more quadrants of the graphical representation of the nuclear reactor core.

6. The method of claim 1, wherein

at least one category is fresh, the fresh category indicating to insert an unexposed fuel bundle; and

the selectively assigning step includes assigning a type designation to the fuel bundle positions assigned the fresh fuel bundle category.

7. The method of claim 1, wherein

at least one category is reinserted fuel bundles, the reinserted category indicates to insert a fuel bundle that has been exposed; and

the selectively assigning step including manually assigning a priority to each of the fuel bundle positions assigned the reinserted category, the priority indicating an order for loading exposed fuel bundles based on an attribute of the exposed fuel bundles.

8. The method of claim 1, wherein

at least one category is reinserted fuel bundles; and

the selectively assigning step including automatically assigning a priority to each of the fuel bundle positions assigned the reinserted category, the priority indicating an order for loading exposed fuel bundles based on an attribute of the exposed fuel bundles.

9. (Cancelled)

10. The method of claim 1, wherein the step of creating the template comprises editing an existing nuclear reactor core template by changing a fuel bundle category assigned to at least one fuel bundle position in the template.

11. The method of claim 10, wherein the fuel bundle categories include at least one of fresh, locked and reinserted, the fresh category indicating to insert an unexposed fuel bundle, the locked category indicating that a fuel bundle currently occupying an associated fuel bundle position in an actual nuclear reactor core remains in that position in creating a new nuclear reactor core loading map, and the reinserted category indicates to insert a fuel bundle that has been exposed.

12. (Cancelled)

13. The method of claim 10, wherein creating the existing nuclear reactor core template step comprises:

accessing a database of templates; and
selecting one of the templates for editing.

14. The method of claim 1, wherein the step of creating the template comprises:
deriving a loading template from a loading map of a selected cycle of nuclear reactor based on the user input parameters.

15. The method of claim 14, wherein the deriving step derives the loading template from the loading map of the selected cycle of the nuclear reactor and the loading map of a cycle previous to the selected cycle.

16. An apparatus for creating a nuclear reactor core template comprising:
a graphical user interface; and
a processor controlling the graphical user interface to display a graphical representation of a nuclear reactor core, and to provide a user with graphical tools for at least one of assigning fuel bundle categories to fuel bundle positions in the graphical representation and editing assigned fuel bundle categories to the fuel bundle positions in the graphical representation to create a template having as constraints that only a fuel bundle matching the assigned fuel bundle categories to the fuel bundle positions be allowed to be loaded in the fuel bundle position.

APPENDIX B – RELATED APPEALS AND INTERFERENCES APPENDIX

No related appeals or interferences are known.

APPELLANT'S BRIEF ON APPEAL UNDER 37 C.F.R. §41.37

U.S. Application No. 10/678,183

Atty Docket No. 24GA5999 (8564-000041/US)

APPENDIX C – EVIDENCE SUBMITTED UNDER CFR 1.130, 1.131,

OR 1.132

None.

APPELLANT'S BRIEF ON APPEAL UNDER 37 C.F.R. §41.37
U.S. Application No. 10/678,183
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**APPENDIX D – DECISIONS RENDERED BY THE COURT OR THE BOARD IN
RELATED APPEALS AND INTERFERENCES SECTION**

None.